areas with riparian and coastal sage scrub habitats to ensure that the biological values are not impaired.

- Off-road or cross country vehicle activity is an incompatible use in the MHPA, except for law enforcement, preserve management or emergency purposes. Restore disturbed areas to native habitat where possible or critical, or allow to regenerate.

Photograph 9-2. Fence design.

- Limit recreational uses to passive uses such as bird watching, photography and trail use. Locate developed picnic areas near MHPA edges or specific areas within the MHPA, in order to minimize littering, feeding of wildlife, and attracting or increasing populations of exotic or nuisance wildlife (opossums, raccoons, skunks). Where permitted restrain pets on leashes.
- Remove homeless and itinerant worker camps in habitat areas as soon as found pursuant to existing enforcement procedures.
- Maintain equestrian trails on a regular basis to remove manure (and other pet feces) from the trails and preserve system in order to control cowbird invasion and predation. Design and maintain trails where possible to drain into a gravel bottom or vegetated (e.g. grass-lined) swale or basin to detain runoff and remove pollutants.

b. Specific Management Policies and Directives

The City of San Diego Subarea Plan (Section 1.5.8) also provides specific management directives for the Northern areas. Both the Carmel Mountain Preserve and Del Mar Mesa Preserve are subject to the specific guidelines as stated in the Carmel Valley Neighborhood 8A, and North City Future Urbanizing Area (NCFUA) Subarea 5 Plan. The following guidelines are taken directly from City of San Diego Subarea Plan Section 1.5.8.

The goals and objectives of the MHPA in the Northern area consists primarily of regional wildlife corridors providing linkages to the core areas of Del Mar Mesa, Los Peñasquitos Canyon Preserve, Los Peñasquitos lagoon, Torrey Pines State Park, the proposed San Dieguito River Valley Regional Park and the Black Mountain area. These linkages and core areas provide an important network of viable native habitats and plant communities, support the full range of native species, and provide functional wildlife connections over the long-term.

Table 9-1 is a complete list of covered species in the Northern Area.

TABLE 9-1
COMPLETE LIST OF COVERED SPECIES IN THE NORTHERN AREA

Plants Covered	Animals Covered
Del Mar Manzanita	Belding's savannah sparrow
Encinitas baccharis	Burrowing owl
Orcutt's brodiaea	California brown pelican
San Diego barrel cactus	California gnatcatcher
San Diego button-celery	California least tern
San Diego goldenstar	California rufous-crowned sparrow
San Diego mesa mint	Canada goose
San Diego thorn-mint	Coastal cactus wren
Shaw's agave	Coopers hawk
Short-leaved dudleya	Golden eagle
Torrey pine	Mountain lion
Variegated dudleya	Southern mule deer
Wart-stemmed ceanothus	Northern harrier
Willowy monardella	Belding's orange-throated whiptail
	Riverside fairy shrimp
	San Diego horned lizard
	Southwestern pond turtle
	Western snowy plover
	White-faced ibis

NCFUA Subarea 5 provides for the following specific management directives, as described in Section 1.5.8:

- All trails through the Del Mar Mesa area shall be clearly demarcated and provide split rail fencing or barriers and signage along sensitive portions to discourage off-trail use. Trails through this area should use the existing disturbed roads as much as possible. No new trails should be cut through the existing habitat. Over the long-term, evaluate existing dirt and disturbed roads and trails for restoration.
- Establish an equestrian use plan for the Del Mar mesa area that avoids vernal pool habitat and associated watershed areas. If possible, this area should be managed as a single unit, avoiding being split into separate entities according to ownership.
- Sensitive areas of Del Mar Mesa should be protected from impacts via adjacent development. Signage should be used to inform people of sensitive resources such as vernal pools, and restriction of off-road vehicle use in the area.
- Occasionally monitor the corridor from Shaw Valley through the Bougainvillea golf course development to the Walden Pond area for wildlife usage (to include mesopredators like opossums, skunks, and raccoons), and feral animals and invasive plant species.

c. Coastal Zone Guidelines for Subarea 5

Carmel Valley Neighborhood 8A area should adhere to the following specific management directives, as described in Section 1.5.8 of the MSCP (1997), which is applicable to Carmel Mountain Preserve:

- Use signage and fencing to delineate and protect sensitive species, and to redirect human access from vernal pools and dudleya populations.
- Develop an equestrian use plan to include a trail system that will avoid wetlands and other highly sensitive areas as much as possible.
- Monitor sensitive areas for off-road/off-trail use. Take necessary measures to prevent such use, and repair damage (at minimum, closure of areas) as soon as feasible, including invasive plant removal.
- Use some of the existing dirt roads for trails. Avoid cutting new trails through habitat areas. Restore/revegetate dirt roads (not used as trails) and other disturbed areas to the appropriate habitat (maritime chaparral, vernal pool, grassland, coastal sage scrub), as determined by biologists.

9.3.6 Trail Features Requiring Maintenance

The following features indicate that the trail has degraded and needs maintenance:

- **Deep Trenching.** A trail that has sunken, causing hikers to feel as though they are walking in a trough. Deep trenching may cause users to walk/ride on level ground to the left or right of the trail, thus widening the trail and causing impacts to adjacent vegetation and soil crusts.
- **Widening.** The trail has become widened from a single or double track to an unattractive wilderness ~~fr~~eeway" of several parallel tracks, each trenched to a varying degree.
- **Short Cuts.** Trail users sometimes travel the shortest distance between two points (a straight line), disregarding the designated trails and creating a web of steep erosive trails.
- **Tripping Hazards.** Tree roots, rocks, and other natural objects are exposed from normal recreational use and erosion.
- **Steepness.** When a trail exceeds a comfortable level of steepness over a long distance, users will either discontinue using the trail or they will not enjoy their excursion.
- **Impacts to Natural and Cultural Resources.** Sensitive plant and animal species, and archaeological sites can be impacted by erosive trails.

9.3.6.1 Designing the Trail System to Minimize Maintenance

The original trail design and its alignments are the most integral component of trail maintenance. A well-designed trail will be easier to maintain, will deteriorate less rapidly, and will provide a more pleasant recreational experience. On the other hand, a poorly designed trail is difficult to maintain, deteriorates quickly and, once you lose it, there is not much that can be done to restore it. In addition, a poorly designed trail will always be less pleasant to hike or ride.

a. Gradient

The Preserves sit atop erosive sandstone strata; therefore, gradients should be low. Trails along the steep slopes require switchbacks to keep gradients low and to minimize erosion. Generally, the linear gradient of a trail in either Preserve should be less than 2–5 percent. Since the sandstone soils are highly erosive, a 5 percent slope may be excessive.

b. Relationship to Existing Contours

On a map, a contour is a line of points that are at the same elevation. If you walk precisely parallel to a contour, you are walking at a level (0 percent) grade. If you walk perpendicular to a contour, you are walking either straight uphill or straight downhill. A well-designed trail is laid out to traverse a hillside, closer to parallel than perpendicular to the contours.

When a trail runs perpendicular to the contours, water runs down the middle of the trail, causing trenching, even at a 10 percent gradient. The only way to get water off the trail is for the route to traverse the natural slope, because then there is always a lower side of the trail. When there is a lower side of the trail, it becomes a simple matter to redirect water across and off the trail, rather than allowing it to cut a channel down the trail's centerline.

c. Outslope

A well-designed trail should be constructed to have a 3 to 4 percent cross-slope grade, tilting toward the outside (downhill side) of the trail to get the water off the trail as soon as possible. Outsloped trails are the easiest to construct if the original trail alignment traverses the natural slope.

d. Switchbacks

A ~~"s~~witchback" is any place where the alignment of a trail traverses a slope in one direction and then abruptly ~~"s~~witches back" toward the opposite direction. Switchbacks are often used to run a trail up a steep slope in a constrained location. Although switchbacks are often the only solution to the problems of rock outcrops and steep slopes, they should be avoided where possible. Unless they are perfectly designed and constructed, switchbacks present an irresistible temptation to people to shortcut the trail and cause erosion over a web of indiscriminately created volunteer routes.

9.3.7 Trail Maintenance

The following maintenance guidelines are summarized from the Park and Recreation Department Open Space Division Trail Standards (City of San Diego 2005).

Inspection of the trail is the first step in trail maintenance. When erosion problems are evident, water may be the cause, and where to divert it is an important issue. The following elements represent the primary mechanisms to be used in the maintenance of trails. They are generally listed in priority order, but each has its own special application and purpose. Maintaining the outslope and the drainage dips represent the most important issues of trail maintenance.

9.3.7.1 Outslope

This is the first order of business in trail maintenance. It is the simplest, but most labor intensive trail maintenance tool.

Normal trail use will build up a berm along the outside (downhill) edge of the trail. If allowed to continue, the berm will grow and prevent water from flowing off the trail, causing the centerline of the trail to become entrenched. If this centerline trench is allowed to continue unchecked, the trail will trench deeper and deeper. Entrenching can be repaired using rolling slopes, which are alternating, multiple, cross-slopes that slow water and reduce erosion.

The outslope is maintained by simply pulling the berm back into the trail tread. This must be done consistently by trail crews. In many cases, if the outslope is restored on a regular basis, little or no maintenance is needed of any other kind. However, some use patterns (extensive equestrian use), soil conditions (sandy), and climate conditions (high precipitation) combine to minimize the effectiveness of this maintenance tool.

9.3.7.2 Drainage Dips

A drainage dip is built into the original trail alignment and is a change in gradient (a ~~"~~dip" in the trail) that dissipates and diverts water flow. It only remains effective at preventing erosion as long as regular maintenance keeps it unplugged.

9.3.7.3 Pruning Overhanging Vegetation

Pruning vegetation is an essential and regular part of trail maintenance, especially in brushy chaparral areas. Multi-use trails should have 10-foot vertical clearance. There may be specific considerations for trail dimensions depending on the location of the trail, to comply with the proper jurisdictions of the region.

Too often, trail pruning is accomplished in the most expeditious manner possible—a branch intrudes within the walking/riding space of the trail and is quickly lopped-off so that it does not intrude and the debris is indiscriminately tossed aside. However, our goal in trail maintenance is

to maintain a trail in as natural appearance as possible. A quick pruning job deals only with the function of trail maintenance, not the aesthetics.

There are six elements of acceptable pruning in the State Park System. Each of these elements makes pruning a more tedious maintenance task, but results with a trail that is compatible with the natural environment.

- **Do not toss debris**: Branches that are randomly discarded usually end up hanging in adjacent shrubs or trees. These dead branches are both unsightly and create a fire hazard.
- **Place debris out of view.** This element requires the extra effort of dragging branches under and around shrubs.
- **Place the butt (cut) end away from the trail.** This will help disguise the debris.
- **Each cut branch should be touching the ground to promote decomposition.** This means that brush piles are not appropriate.
- **Pruning should be done sensitively so that the trail appears natural** and not as if a chain saw was used without regard. Ideally, trail users should not be aware that maintenance work has recently been done.
- **Prune to the collar of any branch stem** for the health of the shrub and a more natural looking result. At the base of any branch there is a wide section that contains a plant's natural healing agents. Any pruning performed away from this collar will expose the plant to a greater risk of infection. A cut at the collar will naturally heal. For large branches over two inches in diameter, cut from the bottom, then cut down from the top. This prevents tearing of the bark, reducing infection.

9.3.7.4 Signing/Mapping

Adequate signing and mapping keeps trail users on the trail. Uncertainty about which trail to use may lead to new trails being created by trail users. These new trails will become maintenance problems and will ultimately need to be abolished.

9.3.7.5 Rolling Slopes

Rolling slopes are alternating, multiple, cross-slopes that can be used to divert water from the trail. At each change in slope, the water is slowed, allowing it to drop sediment. By reducing erosion and allowing sediment to drop onto the trail, an entrenched trail can be repaired. Depending on conditions, this method may effectively rebuild the trail over time.

9.3.7.6 Imported Fill Material

A deeply trenched trail can be restored by importing dirt or decomposed granite, compacting it, and recreating a well-drained outsloped trail. However, in most situations, this approach is usually both cost prohibitive and far too labor intensive.

9.3.7.7 Rerouting Trails

Trail rerouting is beyond the responsibilities of a trail maintenance crew. New trail alignments must be flagged by experienced park staff and then reviewed by resource specialists for compliance with the California Environmental Quality Act. Trail maintenance crews can provide valuable assistance by alerting park staff to those trail routes that may need to be rerouted.

There are three measurements that dictate that trail relocation is needed:

1. When the maintenance crew is dealing with a poorly designed trail that has deteriorated to the extent that remedial measures will not work or will constantly need repair or replacement;
2. A significantly better route is available; and
3. To avoid sensitive habitat/species.

The telltale signs of a trail that needs to be relocated are deep trenching and a gradient exceeding 20 percent over about 100 feet of trail.

9.3.8 Trail Monitoring

Trail monitoring is extremely important in evaluating environmental impacts resulting from a variety of uses on the trails. Some activities will impact the integrity of the trails more so than others, and will need to be actively monitored more closely. It is therefore beneficial to track when activities occur more frequently than others (there may be seasonal differences).

The following guidelines may contribute to keeping track of how many people are actively using the trails, and for what kinds of recreation.

- Identify the impacts being monitored, including impacts to water quality, soils, wildlife, flora, and other users (accidents, injuries, enjoyment of the trail).
- Establish quantitative and qualitative measurement scales for impacts.
- Establish impact thresholds that, if reached, trigger correction or closure of the trail to bicycles, equestrian, or other high impact activity.
- Establish a schedule for monitoring activities.
- Establish a written reporting system.

- Train personnel to follow the monitoring program.
- Reliable trained persons from user groups may be used to supplement monitoring by staff.
- Specify baseline inventories to allow for monitoring of trends.
- Secure the resources to carry out the monitoring plan.

The best enforcement of regulations will come from regular patrolling combined with effective education and an active monitoring program.

Trail monitoring provides organizations and individuals a sense of what is occurring within the Preserves and a method to document degradation and damage to public lands. Trails receive impact from all authorized user groups and unauthorized use such as motorized trespass.

The City Park and Recreation Department, Open Space Division staff reserves the right to restrict the use of and/or close any public trail or access point on Carmel Mountain or Del Mar Mesa to protect public health, safety and welfare. An example of such conditions would include, but is not limited to, restrictions/closures during inclement weather, trail overuse, landform deterioration, and other adverse conditions.

9.4 Research

Research that would require going off the official trails and roads or would require collection of resources from either of the Preserves requires approval from City staff. Research must avoid adverse environmental effects by the researchers' presence and activities. Researchers who apply to conduct their research in the Preserves must present a research design and evidence of their qualifications to conduct such research, including professional training, publications, and experience.

Research on federally listed species must also be approved in writing by the USFWS Carlsbad Field Office. Results of research on federally listed species will be provided to the Carlsbad Field Office and the City of San Diego, MSCP program.

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This Resource Management Plan was prepared for the City of San Diego, located at 202 C Street, Fifth Floor, San Diego, California. The following professional staff participated in its preparation.

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